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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/652,533	08/31/2000	Gurtej S. Sandhu	MI22-1385	4487

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WELLS ST. JOHN P.S.  
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EXAMINER

COLEMAN, WILLIAM D

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 08/14/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/652,533	<b>Applicant(s)</b> SANDHU ET AL.	
	<b>Examiner</b> W. David Coleman	<b>Art Unit</b> 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 June 2003.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-43, 55 and 56 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 55 and 56 is/are allowed.
- 6) ☒ Claim(s) 1-44 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
     If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
     \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
     a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                   | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____  |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                          | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>19</u> . | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Information Disclosure Statement*

It is desirable for an attorney or agent to carefully evaluate and explain to the applicant and others involved the scope of the claims, particularly the broadest claims. Ask specific questions about possible prior art which might be material in reference to the broadest claim or claims. There is some tendency to mistakenly evaluate prior art in the light of the gist of what is regarded as the invention or narrower interpretations of the claims, rather than measuring the art against the broadest claim with all of its reasonable interpretations.

It is desirable to pick out the broadest claim or claims and measure the materiality of prior art against a reasonably broad interpretation of these claims.

It may be useful to evaluate the materiality of prior art or other information from the viewpoint of whether it is the closest prior art or other information. This will tend to put the prior art or other information in better perspective. See *Semiconductor Energy Laboratory Co. v. Samsung Electronics Co.*, 204 F.3d 1368, 1374, 54 USPQ2d 1001, 1005 (Fed. Cir. 2000) ("A withheld reference may be highly material when it discloses a more complete combination of relevant features, even if those features are before the patent examiner in other references." (citations omitted)). However, 37 CFR 1.56 may still require the submission of prior art or other information which is not as close as that of record.

Care should be taken to see that prior art or other information cited in a specification or in an information disclosure statement is properly described and that the information is not

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incorrectly or incompletely characterized. It is particularly important for an attorney or agent to review, before filing, an application which was prepared by someone else, e.g., a foreign application. It is also important that an attorney or agent make sure that foreign clients, including foreign applicants, attorneys, and agents understand the requirements of the duty of disclosure, and that the U.S. attorney or agent review any information disclosure statements or citations to ensure that compliance with 37 CFR 1.56 is present.

See *Semiconductor Energy Laboratory Co. v. Samsung Electronics Co.*, 204 F.3d 1368, 54 USPQ2d 1001 (Fed. Cir. 2000). During prosecution patentee submitted an untranslated 29-page Japanese reference as well as a concise explanation of its relevance and an existing one-page partial English translation, both of which were directed to less material portions of the reference. The untranslated portions of the Japanese reference "contained a more complete combination of the elements claimed [in the patent] than anything else before the PTO." 204 F.3d at 1374, 54 USPQ2d at 1005. The patentee, whose native language was Japanese, was held to have understood the materiality of the reference. "The duty of candor does not require that the applicant translate every foreign reference, but only that the applicant refrain from submitting partial translations and concise explanations that it knows will misdirect the examiner's attention from the reference's relevant teaching." 204 F.3d at 1378, 54 USPQ2d at 1008. See also *Genveto Jewelry Co. v. Lambert Bros., Inc.*, 542 F. Supp. 933, 216 USPQ 976 (S.D.N.Y. 1982) wherein a patent was held invalid or unenforceable because patentee's foreign counsel did not disclose to patentee's United States counsel or to the Office prior art cited by the Dutch Patent Office in connection with the

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patentee's corresponding Dutch application. The court stated, 542 F. Supp. at 943, 216 USPQ at 985:

Foreign patent attorneys representing applicants for U.S. patents through local correspondent firms surely must be held to the same standards of conduct which apply to their American counterparts; a double standard of accountability would allow foreign attorneys and their clients to escape responsibility for fraud or inequitable conduct merely by withholding from the local correspondent information unfavorable to patentability and claiming ignorance of United States disclosure requirements.

Care should be taken to see that inaccurate statements or inaccurate experiments are not introduced into the specification, either inadvertently or intentionally. For example, stating that an experiment "was run" or "was conducted" when in fact the experiment was not run or conducted is a misrepresentation of the facts. No results should be represented as actual results unless they have actually been achieved. Paper examples should not be described using the past tense. See MPEP § 608.01(p) and § 707.07(I). Also, misrepresentations can occur when experiments which were run or conducted are inaccurately reported in the specification, e.g., an experiment is changed by leaving out one or more ingredients. See *Steierman v. Connelly*, 192 USPQ 433 (Bd. Pat. Int. 1975); 192 USPQ 446 (Bd. Pat. Int. 1976).

Do not rely on the examiner of a particular application to be aware of other applications belonging to the same applicant or assignee. It is desirable to call such applications to the attention of the examiner even if there is only a question that they might be "material to patentability" of the application the examiner is considering. It is desirable to be particularly

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careful that prior art or other information in one application is cited to the examiner in other applications to which it would be material. Do not assume that an examiner will necessarily remember, when examining a particular application, other applications which the examiner is examining, or has examined. See *Armour & Co. v. Swift & Co.*, 466 F.2d 767, 779, 175 USPQ 70, 79 (7th Cir. 1972); *KangaROOS U.S.A., Inc. v. Caldor, Inc.*, 585 F. Supp. 1516, 1522, 1528-29, 222 USPQ 703, 708, 713-14 (S.D. N.Y. 1984), vacated and remanded, 778 F.2d 1571, 228 USPQ 32 (Fed. Cir. 1985).

While vacating the summary judgment and remanding for trial in *KangaROOS*, the Court of Appeals for the Federal Circuit stated that a "lapse on the part of the examiner does not excuse the applicant." 778 F.2d at 1576, 228 USPQ at 35.

When in doubt, it is desirable and safest to submit information. Even though the attorney, agent, or applicant doesn't consider it necessarily material, someone else may see it differently and embarrassing questions can be avoided. The court in *U.S. Industries v. Norton Co.*, 210 USPQ 94, 107 (N.D. N.Y. 1980) stated "In short, the question of relevancy in close cases, should be left to the examiner and not the applicant."

See also *LaBounty Mfg., Inc. v. U.S. Int'l Trade Comm'n*, 958 F.2d 1066, 22 USPQ2d 1025 (Fed. Cir. 1992).

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Aarik et al., "Effect of growth conditions on formation of TiO<sub>2</sub>-II films in atomic layer depositions process", Journal of Crystal Growth, vol., 181, pp. 259-264, May 1997.

3. Pertaining to claims 1, 2, 18 and 19, Aarik discloses a deposition method as claimed. Aarik teaches a deposition method comprising:

at a first temperature (425 °C), contacting a substrate with a surface activation agent (TiCl<sub>4</sub>) and adsorbing a first layer over the substrate; and

at a second temperature greater than the first temperature (700 °C), contacting the first layer with a first precursor gas (oxygen, please note that Applicants specification fails to disclose any material composition of a precursor) and chemisorbing some of the first precursor gas into a second layer at least one monolayer thick over the substrate.

4. Pertaining to claim 26, Aarik teaches a deposition method comprising:

adsorbing a surface activation agent over a substrate, at least an outer surface of the substrate being at a first temperature less than a chemisorption temperature of the agent;

altering a temperature of at least a portion of the substrate;

chemisorbing a monolayer of a first compound over the substrate, at least an outer surface of the substrate being at a second temperature greater than the first temperature, and substantially displacing the agent from over the substrate; and

chemisorbing a monolayer of a second compound on the first compound monolayer.

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5. Pertaining to claims 3, 4, 20, 21, 28 and 29, Aarik teaches wherein the surface activation agent comprises a metal halide comprising  $\text{TiCl}_4$ .
6. Pertaining to claim 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 22, 23, 24, 25, 27 and 30 Aarik teaches wherein the first temperature is less than a chemisorption temperature of the surface activation agent on the substrate (see Introduction, second paragraph). The substrate comprises a bulk semiconductor wafer (111 silicon, Experimental procedure). The surface activation agent is the same as the first precursor, which consist of a monolayer. The first layer is substantially displaced from over the substrate during chemisorbing the second layer, hence ( $\text{TiO}_2$  formation).

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aarik et al., "Effect of growth conditions on formation of  $\text{TiO}_2$ -II films in atomic layer depositions process", Journal of Crystal Growth, vol. 181, pp. 259-264, May 1997, as applied to claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29 and 30 above, and further in view of Sherman, U.S. Patent 5,916,365.
9. Aarik discloses a semiconductor process substantially as claimed as discussed above. However, Aarik fails to teach contacting a second layer with a second precursor and chemisorbing a third layer at least on monolayer thick on the second layer, forming a



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chemisorption product of the first and second precursors comprising a deposition material.

Sherman teaches contacting the second layer with a second precursor and chemisorbing a third layer at least one monolayer thick on the second layer, forming a chemisorption product of the first and second precursors comprising a deposition material. See **Example 3** of Sherman, where three or more elements such as oxynitrides by sequentially growing an oxide and then growing a nitride is disclosed. In view of Sherman, it would have been obvious to one of ordinary skill in the art to incorporate the semiconductor process of Sherman into the Aarik semiconductor process because the provides growing oxynitrides by atomic layer deposition (column 8, lines 9-15).

10. Claims 31, 34, 36, 38, 39, 40, 41, 42 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aarik et al., "Effect of growth conditions on formation of TiO<sub>2</sub>-II films in atomic layer depositions process", Journal of Crystal Growth, vol., 181, pp. 259-264, May 1997, in view of Doering et al., U.S. Patent 6,174,377 B1.

11. Pertaining to claims 31 and 34, Aarik discloses a semiconductor process substantially as claimed.

12. A deposition method comprising:  
contacting a bulk semiconductor wafer with a cooling medium (purging gas via adsorption trap cooled down to 100K) to establish at least an outer surface with a surface activation agent and adsorbing a first layer on the wafer, the initial temperature being less than a chemisorption temperature of the agent;

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contacting the first layer with a deposition precursor and chemisorbing a second layer at least one monolayer thick over the wafer. However, Aarik fails to disclose placing a wafer on a heated wafer chuck. Doering teaches placing a wafer on a heated wafer chuck, see **FIG. 10B** of Doering where wafers(not shown) are heated. In view of Doering, it would have been obvious to one of ordinary skill in the art to place wafers on a heated chuck because the Examiner believes that heating is required to form an oxide film.

13. Pertaining to claim 36, Doering discloses wherein there are multiple chambers for the fabrication of atomic layer deposition films (see **FIG. 10A** of Doering).

Pertaining 38, 39, 40, 41, 42 and 43 Aarik teaches wherein the first layer enhances a chemisorption rate of the deposition precursor compared to the wafer without the surface activation agent adsorbed thereon (i.e., it is well known that monolayer of oxygen are always forming on silicon because of there strong bond and by heating the wafer, the process reduces that particular chemisorption rate). Aarik also discloses a metal halide comprising  $\text{TiCl}_4$  wherein the surface activation agent is the same as the deposition precursor. Aarik discloses wherein the second layer consist essentially of a monolayer.

14. Pertaining to claims 32, 33, 35 and 37, the combined teaches discloses a semiconductor process substantially as claimed. However, Aarik fails to disclose elevating the wafer over the heated wafer chuck, placing the wafer on a cooled wafer chuck different from the heated wafer chuck by robotic linear translation. Doering teaches a method wherein elevating the wafer over the heated wafer chuck, placing the wafer on a cooled wafer chuck different from the heated wafer chuck by robotic linear translation. See **FIGS. 2-23** of Doering where a processing station

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adaptable to standard cluster tools has a robotic linear translation for different wafer chucks (i.e., one for heating and one for cooling). In view of Doering, it would have been obvious to one of ordinary skill in the art to incorporate the semiconductor apparatus of Doering in the teachings of Aarik, for the processing of ALD films (see Title).

### ***Double Patenting***

15. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

16. A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

17. Claims 1, 18 and 26 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 1 of U.S. Patent No. 6,355,561 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because the term "moiety" is equivalent to the term "layer".

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*Allowable Subject Matter*

18. Claims 55 and 56 allowed.

*Conclusion*

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

20. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

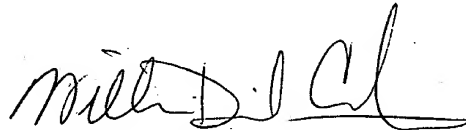
21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to W. David Coleman whose telephone number is 703-305-0004. The examiner can normally be reached on 9:00 AM-5:00 PM.

22. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone numbers for the

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organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7721 for After Final communications.

23. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

A handwritten signature in black ink, appearing to read 'W. David Coleman', with a stylized flourish at the end.

W. David Coleman  
Primary Examiner  
Art Unit 2823

WDC  
August 7, 2003